Arkansas Space Grant Consortium
University of Arkansas at Little Rock
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PROGRAM DESCRIPTION

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Arkansas Space Grant Consortium is a Capability Enhancement Consortium funded at a level of $660,000 for fiscal year 2010.

PROGRAM GOALS

Educational Outcome 1 Goals (Metrics in parentheses)

1. Fund Research Infrastructure Grants to affiliate institutions (27).
2. Fund Student Fellowship/Scholarship Grants (39).
3. Fund STEM/MSI Scholarship/Fellowships (18)
4. Fund Workforce Development Fellowships of $6,500 (6).
5. Continue five (5) existing Collaborative Research Programs
6. Fund Aeronautic Enhancement Program two-year certificate student awards (18).
7. Fund an Aeronautics Enhancement Project with Henderson State University, the only four-year institution in Arkansas that offers a degree in aviation (1).
8. Fund a Statewide University Package Integration for Balloon Flight (2-4)
9. Fund a University BalloonSat/High Altitude Flight Program (1)
10. Continue to collaborate with the National Space Grant Foundation's program for longitudinal tracking of awardees, and participate fully in reporting results to NASA.

Educational Outcome 2 Goals

1. Fund Mini-Grants to K-12 educators in Arkansas to promote their ability to teach STEM related science in their classrooms, and Outreach Grants to K-12 educators in Arkansas who are affiliated with NASA Explorer Schools, in order to enhance their ability to participate in NES programs. Continue to support the 1 *Arkansas*

BalloonSat team and the *Arkansas Academy of Space Science for Educators.* (Mini 32, Outreach 2)
2. Fund an Outreach Rocket Program (1)
3. Offer applications and funding for students to be accepted to a NASA Academy, a Summer Internship at a NASA Center, Graduate Student Research Program, or summer employment positions with NASA affiliated contractors in or out of the state. (as needed)

Educational Outcome 3 Goals

1. Fund Guest Lecturers from STEM disciplines to make presentations for the General Public at affiliate campuses. (1)
2. Hold the 18th Annual Symposium so students and faculty can present their research to their peers and other members of the community.
3. Maintain the ASGC website as needed.
4. Continue active involvement with University Affairs Offices at all the NASA centers.

PROGRAM/PROJECT BENEFIT TO OUTCOME (1,2, OR 3)

Outcome 1:

Hendrix College: 2 students will present their Space Grant results at the Undergraduate Research Session of the American Physical Society Meeting in Dallas April 2011.
University of the Ozarks: 4 students will present Space Grant findings at the National American Chemical Society Meeting in Anaheim, CA in April, 2011.

- Sarah Newton, University of Arkansas at Pine Bluff, presented her ”What does Blood Say?” Analysis of Cobia Sera from an NMR Based Metabolimics Perspective at the UAPB 24th annual research conference. Sarah has also received and EPSCoR–Surf grant from her research that started with Space Grant.

- Mostafa Hemmati, Arkansas Tech University, presented the Keynote talk entitled “Lightning Flashes” to the Junior Science and Humanities Symposium. Results of the Arkansas Space Grant Consortium funded research were included in the presentation. The event was publicized around Russellville. Approximately 200 people attended the presentation including high school students and teachers from all around the state, Arkansas Tech University students and also people from around Russellville.

- Will Slaton and one of his student, Kim Penn, who was partially funded by Space Grant, was published. This work was used to develop a new lab in the University Physics course. Kim earned her BSE and is teaching Chemistry at Conway High School.

  Kim Penn and William V. Slaton, "Measuring Model Rocket Engine Thrust Curves", The Physics Teacher, Volume 48, Number 9, December 2010, 591 - 593.

- Dr. Parimal Chowdhury and Dr. Michael Soulsby, University of Arkansas for Medical Sciences, went to Central High School for an American Physiological Society (APS) sponsored event, during which they demonstrated the hind-limb-suspended rat model (took a rat with permission), they discussed the goal of their experiments, and the students seemed to enjoy the experience. In addition, they have expanded their space-related studies to consider the diabetogenic effects of space-flight, which is a major concern to NASA.
- Ed Wilson, Harding University, is sponsoring/mentoring a Searcy High School Team that successfully submitted a proposal to BHALF, Balloon High Altitude Flight. The team is one of four in the nation to be chosen. They will fly their payload at Glenn Research Center in May. The students are building a novel spectrometer payload weighing less that 750 grams that will measure water vapor in the atmosphere as a function of altitude. The team will receive $1000 for building their payload, they and their mentor will be given funding to travel to Glenn Research Center to launch, recover, and have a tour of the center. This is an outreach project of the Harding ASGC grant for participating in the USLI (University Student Launch Initiative). They are hoping to fly their payload with Tillman Kennon at Arkansas Tech University before going to Glenn.

Outcome 2:

The ASGC Outreach Coordinator was able to increase contact with several of the Math and Science Centers located statewide; therefore further networking with localized K-12 STEM related programs and science focused programs. ASGC presented four programs on the K-12 Mini-Grant application process, encouraging teachers to apply for funding for professional development activities. Response has been positive, as reported below.

Increasing interest is noted in the increased number of emails and telephone calls coming into the Program Office containing inquiries about how to participate, and the number of applications filed.

Members of the ASGC program office also visited with each Workforce Development Fellow and Mentor(s), and with recipients of other undergraduate NASA internships, on their respective campuses, in order to conduct a Q&A session and coordinate internship positions at NASA Centers, research facilities, or with NASA contractors.

Outcome 3:

The 18th ASGC Symposium was held at the Winthrop Rockefeller Institute at Petit Jean Mountain. Attendance was 136. Former Astronaut Duane "Digger" Carey was our Keynote speaker. He spoke on the importance of his education in preparing him for his career in the USAF as a fighter/combat pilot, test pilot, and as a NASA shuttle pilot. He showed highlights from his space shuttle mission, STS-109, then opened the floor to questions. He also gave a presentation at Pottsville High School, in which he showed the DVD "Space Rookies" which is about how you live in space. He then accepted questions from the approximately 350 students in attendance.

PROGRAM ACCOMPLISHMENTS

Outcome 1:

Eight students took next step in FY10 (SG participation supported from FY06-FY10 funds)

- 4 are pursuing advanced degrees in STEM disciplines
- 2 accepted STEM positions at NASA contractors
- 1 accepted a STEM position in K-12 academia
- 1 accepted a STEM position in academia

With our FY10 funding ASGC was able to exceed our goals in most of our Outcome 1 areas. ASGC funded 37 Research Infrastructure awards, 5 Student Fellowships, 55 Student Scholarship and 6 Workforce Development Fellowships. Five Collaborative Research Projects were funded, of which 11 faculty and four graduate students and 11 undergraduate students were funded. Our goals for these programs were 27, 39 and 6 respectively. ASGC exceeded these goals because the awards this year were smaller and more individuals could be funded.

The STEM/MSI program was not as productive as last year. There were six awards and five travel awards made. This is well below our goal of 16 and 11 respectively. The program office is exploring new ways to stimulate this program and increase participation. The STEM MSI program has not expended its funding for this year, and we expect to make additional awards prior to our grant cut-off date. We are also exploring new ways to expend these funds in a more timely fashion in the future. (As this initial report was sent ninety day early, the above facts were improved upon, and by years' end we had awarded 20 STEM and 16 STEM Travel awards, exceeding our original goals.)

ASGC's Aeronautics' Enhancement activities have progressed very well. The first was to fund an aeronautics project with Henderson State University, the only four-year institution in Arkansas that offers a degree in Aviation. This was successful, in that we were able to fund two awards. Our second program, mentioned in Educational Outcome 1 Goal #6, has become more successful than previously expected. We had originally planned to fund about 10 A&P mechanics students at the five (5) Arkansas 2-year program schools, something the State of Arkansas has identified as a growth sector. Since implementation, an additional 2-year school has been added. ASGC received 42 proposals for funding and was able to award 18.

The University BalloonSat/High Altitude Flight Program and the Statewide University Package Integration for Balloon Flight had a slow start. In February ASGC/ Arkansas NASA Program office held a workshop with a section focusing on Ballooning. There were several teams created and a call for proposals will be released shortly to get this program started.

In FY10 ASGC added John Brown University (JBU) as a non-voting member to our affiliation. JBU is the only traditional 4-year college/university in Arkansas that is not a

fully funded, voting member. Due to budget constraints the ASGC program office is not able to bring them to that level at this time.

Outcome 2:

Our K-12 programs have gained popularity this year. We awarded 6 Outreach Grants, thru which 27 teachers received funding for professional development. 34 Mini-Grants were funded, of which 3 went support our partnership with the Civil Air Patrol. Seven CAP-AEM renewals were funded for teachers who requested them. Total teachers and youth-leaders funded: 72

ASGC used funds from the Student Fellowship program to fund a summer internship for David Blackburn who went to the Jet Propulsion Laboratory to conduct research with Dr. Bonnie Buratti. His 10 week internship involved the analysis of the data from the Visual Infrared Mapping Spectrometer (VIMS) on board the Cassini spacecraft.

Outcome 3:

1. Hosted former Astronaut Duane "Digger" Carey was our Keynote speaker. He spoke on the importance of his education in preparing him for his career in the USAF as a fighter/combat pilot, test pilot, and as a NASA shuttle pilot. He showed highlights from his space shuttle mission, STS-109, then opened the floor to questions. He also gave a presentation at Pottsville High School, in which he showed the DVD "Space Rookies" which is about how you live in space.
2. The 18th Annual Symposium was held at the Winthrop Rockefeller Institute where students and faculty presented their research to their peers and other members of the community. A total of 136 were in attendance.
3. Continued to maintain and update the ASGC website as needed.

PROGRAM CONTRIBUTIONS TO PART MEASURES

- Longitudinal Tracking:

Outcome #1 (employ and educate)
Student Data and Longitudinal Tracking: Total awards = 93
Fellowship/Scholarship = 78
Higher Education/Research Infrastructure = 15
17 of the total award represent underrepresented minority F/S funding.
During the FY10 program year 4 are pursuing advanced degrees in STEM disciplines, 2 accepted STEM positions at NASA contractors, 1 accepted a STEM position in K-12 academia, and 1 accepted a STEM position in academia.

For all students that were significantly supported in the period spanning FY06-FY10, 14 students graduated and are pursuing advanced STEM degrees, 2 accepted STEM positions at NASA contractors, 6 students accepted STEM positions in industry, 1 accepted a STEM position in K-12 academia, and 5 accepted STEM positions in academia and 1 is in a non-stem discipline.

- Course Development:
  University of the Ozarks – use Space Grant funding in their Special Topics and Tutorial Practicum Courses(REVISED)
  Lyon College: Over the past 10+ years, Dave Thomas has done research on astrobiology and the biology of extreme environments. Dr. Han Chuan Ong started collaborating with Dr. David Thomas to do cave research as a subset of "extreme environments." Dr. Mark Schram joined the cave research collaboration this year.

    - BIO100 Biology in Context, taught by Drs. Ong and Thomas.
      This non-majors biology course is usually taught with an overall theme, which varies by instructor. Dr. Ong teaches a biotechnology-themed course which includes a section on space biology. Dr. Thomas teaches an astrobiology-themed course. (REVISED)

    - BIO340 Ecology, taught by Dr. Schram.
      This biology majors' course includes a lecture/lab/field module on cave ecosystems. Dr. Thomas often assists with the field component. (REVISED)

    - BIO349 Earth Systems, taught by Dr. Thomas.
      This biology majors' course includes a lecture/lab/field module on cave formation and cave biology. (REVISED)

    - BIO350 Microbiology, taught by Dr. Thomas.
      This biology majors' course integrates research on "extreme environments" and extremophile microorganisms. (REVISED)

    - BIO352 Molecular Biology, taught by Dr. Ong.
      This biology majors' course includes lectures on the origin of life and the "RNA World" hypothesis. (NEW)

    - BIO382 Topics in Biology, taught by biology faculty.
      This designation covers a wide variety of biology majors' electives that are not specifically included in the Lyon College catalog. Dr. Thomas has taught topics courses in astrobiology and speleology (cave science). (NEW)

- Matching Funds: ASGC received a little over 1:1 matching funds totaling $889,815. $608,190 came from affiliate match, $257,400 from waived In-direct Cost, and $24,225 from administrative salary release. At the time the original proposal was submitted, the ASGC program office was unaware of the amount of match to be contributed by the affiliates.

- Minority-Serving Institutions: Arkansas has only one HBCU, the University of Arkansas at Pine Bluff. UABP has become more competitive over the past few years in NASA related research, thus involving more under-served minority students.

IMPROVEMENTS MADE IN THE PAST YEAR

This year, ASGC has solidified its offering of the 2 year college A&P program scholarships, the Henderson State Aeronautics awards, and the STEM/MSI program for Arkansas. We have expanded the number of A&P awards from 12 to 18 total awards and have found a significant student population for these scholarships. These two year college awards are the first made from Space Grant in Arkansas and are having a direct impact on the fledgling Arkansas aviation/aerospace industrial sector. This sector has been the fastest growing sector of the Arkansas economy according to our Governor's Office. The Henderson State University pilot training program is the state's only such program. By bringing funding for research to that program, ASGC is having an impact on the type students in the program. Our efforts are bringing aviation and science/technology together. Finally, our efforts in the STEM/MSI program have offered our programs to some related fields and have brought us to additional students and increased our outreach to underrepresented minority and underprivileged groups in the state. Note that the STEM MSI program has not expended its funding for this year, and we expect to make additional awards prior to our grant cut-off date. This program was a tremendous success last year, and we hope to approach those levels again this year once all funds are awarded.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

Four-Year Higher Education Institutions (Affiliates)

Arkansas State University - Jonesboro†
Arkansas Tech University - Russellville
Harding University – Searcy*
Henderson State University - Arkadelphia
Hendrix College – Conway*
Lyon College – Batesville*
Ouachita Baptist University – Arkadelphia*
Southern Arkansas University - Magnolia
University of Arkansas, Fayetteville†
University of Arkansas at Ft. Smith
University of Arkansas at Little Rock†
University of Arkansas for Medical Sciences – Little Rock†
University of Arkansas at Monticello
University of Arkansas at Pine Bluff ‡
University of Central Arkansas - Conway
University of the Ozarks – Clarksville*

Partners in Aerospace

Arkansas Department of Aeronautics – updates on aeronautics development in Arkansas
Aerospace Education Center – meeting place and input on aerospace programs
Arkansas Department of Education – input and K-12 standards
Arkansas Department of Higher Education – input and higher education standards for the state
Arkansas Science and Technology Authority – cash matching and state Science & Technology standards
BEI Systems & Space Division – industry contact and input
Civil Air Patrol – Arkansas Wing – aerospace education, teacher/flight program cooperation

*Private Institutions
†Research/PhD Granting Institutions
‡HBCU